

A COMPARISON OF 1983 AND 1994 BIRD SURVEYS OF POHNPEI, FEDERATED STATES OF MICRONESIA

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ABSTRACT.—Relative abundance and habitat use of 29 forest bird species, including 22 land birds (18 indigenous breeding residents, 3 exotics, 1 migrant) along with a rail, heron, and five seabirds (shearwater, tropicbird, 3 terns) were assessed on Pohnpei [Island] during summer 1994 and compared with the results of the first survey in 1983. The most frequently encountered species in both surveys were the Purple-capped Fruit-Dove (*Ptilinopus porphyraceus*), Pohnpei Lory (*Trichoglossus rubiginosus*), Micronesian Starling (*Aplonis opaca*), and Micronesian Honeyeater (*Myzomela rubratra*). Among the five species endemic to Pohnpei, the Pohnpei Mountain Starling (*Aplonis pelzelni*) verges on extinction, with only one confirmed sighting in nearly 50 years; the Long-billed White-eye (*Rukia longirostra*) is vulnerable to encroaching agriculture in its preferred and limited montane habitat, where nearly 90% of the sightings were on approximately 10% of the land area, and the Pohnpei Lory (*Trichoglossus rubiginosus*), Pohnpei Flycatcher (*Myiagra pluto*), and Pohnpei Fantail (*Rhipidura kubaryi*) are widespread and common, but were less frequently encountered in 1994 than in 1983. The total number of birds encountered per observation station during 8-minute point counts in each of six elevation zones was 67–80% fewer in 1994 than in 1983. Encounter rates (birds/hour) were reduced by at least 50% in both uplands and lowlands in at least 14 of 29 species; none of the 29 showed an overall increase. Artifacts of sampling and sampling bias may have contributed to reduced observation rates, but anecdotal evidence suggests a decline in numbers is real and may be attributed to combined effects of habitat degradation, hunting practices, and possibly predation by introduced species. Protection of the upland forests from further degradation and more frequent monitoring to better assess population trends are recommended. Received 26 Oct. 1999, accepted 15 April 2000.

The first quantitative surveys of Micronesian birds were conducted in the early 1980s by the U.S. Fish and Wildlife Service (USFWS); Pohnpei was surveyed during May and June 1983 (Engbring et al. 1990). The most recent (and first follow-up) survey was supported by the South Pacific Regional Environment Programme (SPREP) through the South Pacific Biodiversity Conservation Programme and the South Pacific Regional Avifauna Conservation Programme. The survey was conducted in May and June 1994 and its results are reported here. The 1983 and 1994 surveys were confined to forest habitats, the most widespread vegetation type on the island and the principal or sole habitat type for all the single island endemics and otherwise rare species. Habitat preferences and relative abundance were assessed for the same 29 species in both years, and the 1994 team attempted to duplicate as close as possible the routes and methods of the original survey.

STUDY AREA AND METHODS

Study area.—Pohnpei is a roughly circular 23 km diameter five million year old volcanic dome (355 km² in area) located 766 km north of the equator in the Eastern Caroline Islands, Federated States of Micronesia (Fig. 1; MacLean et al. 1986, Merlin et al. 1992, Office of Budget, Planning and Statistics 1994). Maximum recorded elevation is 772 m at Nahnalud (U.S. Geological Survey 1983) with at least ten other peaks in the central highlands exceeding 600 m (U.S. Army Corps of Engineers 1986). Densely forested, steep ridges and deep valleys radiate outward and downward to foothills and coastal lowlands, including a mangrove zone up to about 2 km wide. A discontinuous barrier reef encloses a lagoon up to 6 km wide along with numerous volcanic and coral reef islets. The major vegetation types are native upland forest, agroforest (where fruit trees and other agricultural plants are grown among forest trees, preserving much of the original canopy and understory), mangrove forest, secondary vegetation, and swamp forest. Grasslands, marshes, croplands, urban areas, barren regions, and aquatic areas are minor components, together contributing about 6% of the total area (MacLean et al. 1986).

Warm, humid conditions prevail throughout the year. The average annual temperature is 27° C and the average monthly temperature does not vary from the annual average by more than 1° C (Laird 1982). Relative humidity averages 80–90%. Mean annual rainfall in Kolonia is approximately 485 cm, with no month averaging less than 25 cm (U.S. Army Corps of Engineers 1986), with as much as 1,051 cm/yr estimated

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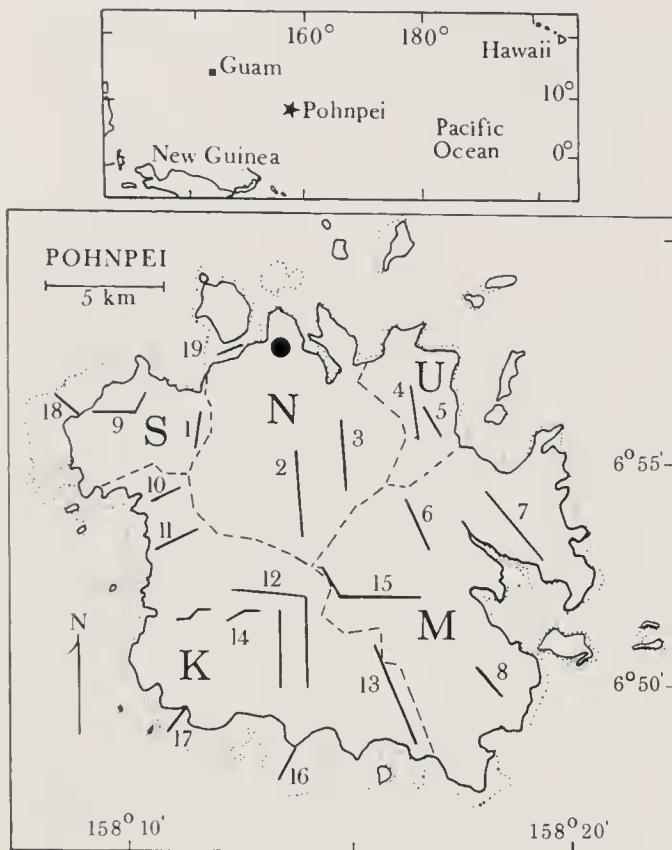


FIG. 1. Location of Pohnpei and transects for summer 1994 forest bird survey; municipality abbreviations are K = Kitti, M = Madolenihmw, N = Nett, S = Sokehs, U = U; ● = Kolonia.

for the mountains (Merlin et al. 1992). The 1983 survey was conducted during the most severe drought in Pohnpei history, with precipitation through May totaling only 24 cm (Engbring et al. 1990). The 1994 survey was conducted under more normal weather conditions with 177 cm of precipitation recorded during January–May, closely approximating the mean (183 cm) for the years 1961–1990 (Kolonia Weather Station records; H. Simon, pers. comm.).

Subsistence farming is widespread in the vicinity of the settlements; the chief crops are banana (*Musa*), breadfruit (*Artocarpus*), coconut (*Cocos*), yam (*Dios-*

corea), taro (*Alocasia*, *Colocasia*, and *Cyrtosperma*), tapioca (*Manihot*), and sakau (*Piper methysticum*; U.S. Army Corps of Engineers 1986).

Habitat and elevation zones.—Habitat and vegetation type correlate broadly with elevation on Pohnpei; I followed Engbring and coworkers (1990) in calculating bird species distribution separately in six elevation zones (Table 1), which I merged into uplands (> 200 m) versus lowlands (< 200 m) for comparisons between species and survey years (Table 2).

Mangrove forest, dissected by natural streams and manmade channels, forms a nearly continuous belt around the island covering about 55 km² (Petters et al. 1986). It reaches its greatest width (2 km) along the southern and western shores. Clearcutting, landfills, dredging, and other commercial and private developments continue to encroach on this habitat, especially in the vicinity of settlements. Mature forest is dominated by *Rhizophora*, *Bruguiera*, *Sonneratia*, and *Xylocarpus*. The understory is open and the canopy is about 20–30 m high.

The 0–100 m zone includes populated coastal lowlands, river valleys, agroforest, and patchy native forest along with marshes, grassy areas, and dense thickets of *Hibiscus*.

The 100–200 m zone is similar to the lower zone but the slopes are steeper, the native forest is more extensive, and agroforest and human habitation less pervasive. Common forest plants include the hardwoods dohng (*Camposperma brevipetiolata*), seir en wai (*Cananga odorata*), sadak (*Elaeocarpus carolinensis*), karara (*Myristica insularis*), and ais (*Parinari laurina*) along with tree ferns (katar; *Cyathea* spp); the ivory nut palm (oahs; *Metroxylon amicarum*) is common in the wetter areas. The canopy is about 25–35 m high.

The 200–400 m zone is largely unpopulated. Steep hillsides are covered in native broadleaf forest with a canopy about 25–35 m high. Madeau (*Cinnamomum carolinense*) is locally common and kotop (*Clinostigma ponapensis*), an endemic palm, becomes more numerous near the upper limits of the zone. Tree ferns and young palms dominate the understory.

The 400–600 m zone grades imperceptibly from the

TABLE 1. Characteristics for 1983^a and 1994 Pohnpei forest bird survey stations.

Elevation (m)	% of area ^b	Number of stations		Birds per station ^c		
		1983	1994	1983	1994	% difference
Sea level ^d	15.7	44 (9.6% ^e)	36 (11.9%)	38.6	12.6	−67.4
0–100	40.7	130 (28.4%)	56 (18.5%)	71.0	15.9	−77.6
100–200	17.5	78 (17.0%)	79 (26.1%)	67.9	16.2	−75.4
200–400	15.8	92 (20.1%)	77 (25.4%)	63.3	16.4	−74.2
400–600	8.4	89 (19.4%)	48 (15.8%)	57.5	13.9	−75.8
600–800	1.9	25 (5.5%)	7 (2.3%)	44.4	9.0	−79.8

^a Based on data from Engbring et al. 1990.

^b Percent of the total area for all elevation zones combined; calculated from data in Engbring et al. (1990).

^c Calculated as the mean number of observations of the 18 species of indigenous land birds, pigeons through passerines.

^d Mangrove forest.

^e Percentage of the total number of stations.

lower one but has steeper slopes and more extensive areas of palm forest. Depending on edaphic conditions, the upper limits abut, gradually merge with, or form a narrow transition zone into cloud forest.

The cloud forest predominates on steep slopes, razorback ridges, and mountain summits at 600–800 m in elevation. The trees (many of the species also occurring at lower elevations) are only 5–10 m tall and are festooned with mosses, liverworts, and ferns, which also carpet the forest floor. Shrubs are common, including the high elevation endemic melastome, duduhmwoal (*Astronidium ponapense*). Patches of the high elevation endemic pandanus (*Pandanus patina*) occur in the flatter and wetter areas. Kotop palms are present, but not on the highest crests.

Survey methods.—Three survey teams, each consisting of a primary counter (team leader), usually two secondary counters (mainly College of Micronesia students), and one or two local guides recorded all birds seen and heard over unlimited distance during single eight-minute sessions at each of 303 stations (observation points) distributed 200 m apart along 19 forest transects islandwide, 23 May–3 June 1994 (Fig. 1, Table 1). Transects were selected using topographic maps (U.S. Geological Survey 1983) to provide widespread coverage of the island in roughly the same pattern as the 1983 survey. The specific routes were determined by local topography, and the distances between points were measured with topometric hipchains. The straight lines in Fig. 1 are an abstraction because the rugged terrain made it impossible to follow compass bearings very far. Roads and settled areas were excluded from both surveys.

Several practice sessions preceded the actual survey to familiarize the visiting biologists with the local avifauna and to introduce survey techniques to participants unfamiliar with them. The counts began at sunrise and none was initiated after 11:00. They were suspended whenever adverse weather conditions made detection difficult. At the end of each eight-minute session, the counters compared and pooled their results. The team leaders included C. Faanes and C. Rowland (U.S. Fish and Wildlife Service, mainland and Honolulu offices, respectively) and the author. To compare our results with those of the previous surveys, I calculated the encounter rates (birds per station and birds per hour by elevation zone) for each species and applied a χ^2 goodness of fit test for significance.

I followed Engbring and coworkers (1990) in excluding migrants (and vagrants) with the exception of the Long-tailed Cuckoo (*Eudynamis taitensis*). I included seabirds that nest and roost in the forested parts of the island along with several primarily grassland or savanna species and the Rock Dove (*Columba livia*), which occurs widely among the villages and settlements but is unestablished in native forest habitats. Vernacular and scientific names are from Pratt and coworkers (1987).

RESULTS

Rare species.—Six of the 29 species were recorded only once during all point counts in

1983 and 1994 combined. The Pohnpei Mountain Starling (*Aplonis pelzelni*), endemic to Pohnpei, is almost certainly the rarest resident bird species on the island, with only one confirmed [specimen] record (postdating both surveys) during the past 50 years (Buden 1996). Local residents claim to see it in the mountains from time to time, but I have encountered none in the past seven years other than the specimen obtained in July 1995.

The introduced Rock Dove (*Columba livia*) and the Long-tailed Cuckoo (*Eudynamis taitensis*), an austral winter visitor to Micronesia from New Zealand, likewise were unrecorded during both surveys. Small flocks of 5–10 domesticated pigeons were observed in Kolonia in 1983 and 1994. More recently, local residents informed me of other flocks in outlying settlements virtually around the entire island in all five municipalities. However, *C. livia* seemingly remains unestablished in and tends to avoid native forest habitats. The Long-tailed Cuckoo was observed one time each by the 1983 and 1994 teams, but not on point counts. I have not encountered it on Pohnpei proper, but recorded it on visits to outlying atolls, including Mokil (Buden 1995) and Kapingamarangi (Buden 1998), and the residents of Sapwuhfik Atoll consider it a regular visitor to their islands (Buden 1999).

Audubon's Shearwater was counted once and observed on five other occasions by the 1983 team. None was counted in 1994, but I heard several calling in the Lehn Mesi valley southwest of Nahnalaud, about midway to the village of Salapwuk at 05:00 on 26 May 1994. Audubon's Shearwater roosts and breeds in burrows in the more remote parts of the island (Engbring et al. 1990), and because it is vocal only at night the methodology undercounts it. Its status is difficult to assess but it probably continues to breed in small numbers in the central highlands. The most recent records are several I heard calling from a wooded hillside overlooking the harbor just north of Kolonia at dawn several times in May 2000.

The White-browed Crake (*Porzana cinerea*) and Short-eared Owl (*Asio flammeus*) were encountered only once each in 1994 and not at all in 1983. A crake was heard calling in mangroves (transect 18, station 13) at about 08:45 on 24 May and an owl was seen in lowland marsh (transect 7, station 10) at about 08:

TABLE 2. Encounter rates (individuals per hour) of forest birds in upland and lowland habitats on Pohnpei during summer surveys in 1983^a and 1994.

Species and status ^b	Above 200 m		Below 200 m		% difference ^c	
	1983	1994	1983	1994	Uplands	Lowlands
Audubon's Shearwater (R) (<i>Puffinus lherminieri</i>)	?	0	?	0	NC	NC
White-tailed Tropicbird (R) (<i>Phaethon lepturus</i>)	4.6	1.3	2.6	1.4	-72***	-46
Pacific Reef-Heron (R) (<i>Egretta sacra</i>)	?	0	?	0.3	NC	NC
Red Junglefowl [chicken] (I) (<i>Gallus gallus</i>)	9.4	1.7	21.8	2.0	-82***	-91***
White-browed Crake (R) (<i>Porzana cinerea</i>)	0	0	0	0.1	NC	NC
Brown Noddy (R) (<i>Anous stolidus</i>)	35.9	4.1	43.4	6.2	-89***	-86***
Black Noddy (R) (<i>Anous minutus</i>)	0	0	0.7	0.3	NC	-57
White Tern (R) (<i>Gygis alba</i>)	2.9	1.4	6.3	2.1	-52*	-67**
Roek Dove (I) (<i>Columba livia</i>)	0	0	0	0	NC	NC
Caroline Islands Ground-Dove (R) (<i>Gallicolumba kubaryi</i>)	0	0.2	0.6	0.2	NC	-67
Purple-capped Fruit-Dove (R) (<i>Ptilinopus porphyraceus</i>)	105.5	16.9	109.8	16.0	-84***	-85***
Micronesian Pigeon (R) (<i>Ducula oceanica</i>)	4.4	1.0	1.3	0.5	-77***	-62
Pohnpei Lory (R*) (<i>Trichoglossus rubiginosus</i>)	63.2	16.6	52.9	13.4	-74***	-75***
Long-tailed Cuckoo (NBV) (<i>Eudynamis taitensis</i>)	0	0	0	0	NC	NC
Short-eared Owl (R) (<i>Asio flammeus</i>)	0	0	0	0	NC	NC
Island Swiftlet (R) (<i>Aerodramus vanikorensis</i>)	5.5	4.1	6.2	4.7	-26	-24
Micronesian Kingfisher (R) (<i>Halcyon cinnamomina</i>)	13.3	6.2	21.0	5.6	-53***	-73***
Cieadabird (R) (<i>Coracina tenuirostris</i>)	0.3	0.1	0.7	0.4	-44	-75
Pohnpei Flycatcher (R*) (<i>Myiagra pluto</i>)	22.7	7.4	27.2	7.0	-67***	-74***
Pohnpei Fantail (R*) (<i>Rhipidura kubaryi</i>)	12.6	4.7	23.3	4.9	-63***	-79***
Caroline Islands Reed-Warbler (R) (<i>Acrocephalus syrinx</i>)	2.6	1.4	5.9	2.5	-49	-58***
Pohnpei Mountain Starling (R*) (<i>Aplonis pelzelni</i>)	0	0	0	0	NC	NC
Micronesian Starling (R) (<i>Aplonis opaca</i>)	58.0	20.6	64.6	19.1	-64***	-71
Micronesian Honeyeater (R) (<i>Myzomela rubratra</i>)	82.7	21.7	96.2	30.5	-74***	-68***
Caroline Islands White-eye (R) (<i>Zosterops semperi</i>)	6.1	0.9	10.0	1.2	-85***	-88***
Gray White-eye (R) (<i>Zosterops cinereus</i>)	37.6	7.2	60.9	10.4	-81***	-83***
Long-billed White-eye (R*) (<i>Rukia longirostra</i>)	25.0	4.1	2.6	0.5	-84***	-83***

TABLE 2. CONTINUED

Species and status ^b	Above 200 m		Below 200 m		% difference ^c	
	1983	1994	1983	1994	Uplands	Lowlands
Blue-faced Parrotfinch (R) (<i>Erythrura trichroa</i>)	0	0	0.6	0.4	NC	-33
Hunstein's Mannikin (I) (<i>Lonchura hunsteini</i>)	0.2	0.2	3.5	1.4	NC	-60

^a Data from Engbring et al. (1990).

^b R = indigenous breeding resident, NBV = nonbreeding visitor, I = introduced and established, * = endemic to Pohnpei.

^c Percent increase (+) or decrease (-) in encounter rate (1983 to 1994), with results of χ^2 goodness of fit test for rates standardized to 10 hours (1983 vs 1994); 1 df, *: $P < 0.05$, **: $P < 0.01$, ***: $P < 0.001$, NC: no comparisons, insufficient data.

30 on 23 May. The skulking habits of the crane and its predilection for densely vegetated wetlands doubtless have contributed to the paucity of sightings; its current status on Pohnpei is uncertain but it probably remains an uncommon resident in low wetlands. In Micronesia, the Short-eared Owl is resident only on Pohnpei; the endemic subspecies (*A. f. ponapensis*) is dubiously distinct from the nominate form (Engbring et al. 1990). Population estimates of the owl on Pohnpei have been low for several decades, ranging upwards to as many as about 50 birds during the mid-1950s (Marshall 1962). Reports from local Pohnpeians, including responses to questionnaires I distributed regarding recent sightings, suggest it is more numerous than the literature indicates. Most of the reports I received were of day-time sightings usually in open grassy or weedy areas, or at the forest edge. Bruce Crossan (pers. comm.), former Peace Corps Director for Pohnpei reported four seen together in a savanna area just outside of Kolonia about 18:00 on 30 March 1997.

Uncommon species.—I include Huntstein's Mannikin (*Lonchura hunsteini*) as "uncommon" despite 123 observed in 1983 (111 in the 0–100 m zone) and 32 in 1994. The introduced mannikin is common in grassy, weedy areas in the lowlands but absent from true forest. The indigenous Blue-faced Parrotfinch (*Erythrura trichroa*), also primarily a grassland or savanna species, probably has always been uncommon on Pohnpei, even in its preferred habitat (Engbring et al. 1990). Harvey Segal (pers. comm.), a naturalist residing on Pohnpei for 31 years, recalled seeing parrotfinches in the past but none in recent years. I have seen no more than five or six in the

past seven years. The Pacific Reef-Heron (*Egretta sacra*) is seen regularly in coastal areas, but only occasionally in the interior, mainly along rivers, and the Black Noddy (*Anous minutus*) also is more numerous in coastal habitats. The Caroline Islands Ground-Dove (*Gallicolumba kubaryi*; 0.04 birds/station in 1983 and 0.02 in 1994) and the Cicadabird (*Coracina tenuirostris*; 0.06 birds/station in 1983 and 0.02 in 1994) were among the least frequently encountered species during both surveys; their populations have always been low, at least in historical times (Engbring et al. 1990, Baker 1951).

Common species.—Three species of seabirds roost and breed regularly in the forests of Pohnpei. The Brown Noddy (*Anous stolidus*) was the most numerous in both surveys, averaging 43.4 encounters per hour in the lowlands in 1983 but 1994 encounter rates were 89% and 86% lower in uplands and lowlands, respectively. The White-tailed Tropicbird (*Phaethon lepturus*) and White Tern (*Gygis alba*) also were frequently seen in the forest but less often in 1994 than in 1983 (Table 2).

Fourteen land birds among the 29 forest bird species are sufficiently abundant as to be encountered on average at least once during several hours in the field in suitable habitat. All 14 showed a reduction in encounter rate between 1983 and 1994 except the Caroline Islands Ground-Dove, which was unrecorded above 200 m in 1983 but observed twice in 1994.

In 1994, in decreasing order of abundance, and in uplands as well as lowlands, the four most abundant species were the Micronesian Honeyeater (*Myzomela rubratra*), Micronesian Starling (*Aplonis opaca*), Purple-capped

Fruit-Dove (*Ptilinopus porphyraceus*), and Pohnpei Lory (*Trichoglossus rubiginosus*). The same four were also the most numerous in the uplands in 1983, but in a different order (fruit-dove, honeyeater, lory, starling), whereas in the lowlands, the Gray White-eye (*Zosterops cinereus*) displaced the lory from the list for the fourth position and the starling was ranked third.

DISCUSSION

There have been no known additions, extinctions, or extirpations to the resident avifauna between 1983 and 1994, but encounter rates declined markedly for nearly all species in all forest habitats. The reduction in total birds per observation station for 18 native resident land birds ranges from 67.4–79.8% in each of six major elevation zones (Table 1). Among the 17 of 29 forest species with encounter rates of at least 0.5 birds/hr in 1983 and 1994, 15 (88%) had encounter rates reduced by at least 50% (Table 2); none increased.

To what extent this reduction reflects actual widespread decline in populations is uncertain. The 1983 survey was during a severe El Niño induced drought. The ordinarily lush and verdant landscape was more sere and sparse and may have enhanced detectability. Birds may have been more active in search of diminished resources caused in part by widespread fires. The possibility of a bias between survey teams with respect to their interpretation of multiple calls and sightings at a single station as belonging to one bird or to more than one also exists. However, multiple observers working in concert during both surveys (at least 2–3 overall in 1983 and 2–3 per team in 1994) would tend to moderate any single observer bias. These and other possible artifacts of sampling notwithstanding, my overall impression is of relatively few birds in the forest island-wide. Two surveys 11 years apart do not establish a trend by themselves. But if population numbers are reduced as much as anecdotal evidence would seem to indicate, several factors can be hypothesized as contributing to that decline.

Predation mainly by introduced species may account for some losses among birds. Rats (*Rattus* spp.) are the most common potential avian predators on the island. The

black or roof rat (*R. rattus*) is the most numerous rat and occurs from sea level to high mountain ridges, whereas the Polynesian rat (*R. exulans*) occurs mainly in grasslands and lower montane forest, and the Norway rat (*R. norvegicus*) is found only locally in some areas of human habitation (Jackson and Strecker 1962). Although the detrimental effects of rats on many island populations of birds is well documented (e.g., Garnett 1984, Seitre and Seitre 1992, Milberg and Tyrberg 1993), Strecker and Jackson (1962) reported that rats on Pohnpei fed largely on plants and invertebrates. There is no evidence to suggest that rat populations are more numerous in forest habitats now than in the past or that birds have become a more important part of their diet.

Domestic cats (*Felis catus*) are common house pets in the settlements, and I have often seen spoor of feral cats throughout the central highlands where they are extremely secretive. They doubtless prey on birds, but Marshall (1962) reported that rats were their primary prey. Wild pigs (*Sus scrofa*) are scarce, if still extant, as is the monitor lizard (*Varanus indicus*), which was introduced during the early 1900s (Buden 2000). The Short-eared Owl is the only bird of prey on the island but it feeds mainly on rats and only occasionally on birds (Marshall 1962). It probably has always been present in small numbers (Engbring et al. 1990). The possible role of parasitic infections or introduced avian diseases in reducing bird numbers on Pohnpei has not been investigated.

Excessive hunting may have depleted populations of certain game species, especially the Micronesian Pigeon. Baker (1951:195), quoting from Coultas' field notes of 1930 stated that "two or three years ago, 4–5 Japanese [professional hunters], each, averaged from 75–100 birds [Micronesian Pigeons] per day," and Baker (1951:195) went on to say that even as early as the 1930s, Coultas considered it a "rapidly disappearing species on Pohnpei." Resident Pohnpeians still hunt birds and children often target them with slingshots or pellet guns. The Micronesian Starling is the most frequently eaten songbird. I find it difficult to reconcile the exceedingly small number of hunters encountered in the forest with the drastically reduced numbers indicated by the 1994 survey for virtually all species. Jour-

neys of several days across the island are often completed without encountering anyone else in the forest, and the sounds of gunshots, which would be expected to carry long distances in the valleys are very seldom heard. On the other hand, the failure of the Micronesian Pigeon to rebound in the years following prohibition of professional hunting also is puzzling.

If the decline in bird numbers is real, one possible contributing factor is the progressive loss or alteration of habitat. Trustrum (1996), basing his conclusions on aerial photo analyses, reported a decline in native upland forest from 42% of the total vegetation cover in 1975 to 15% in 1995, which he attributed largely to cultivation of sakau (= kava in Fiji; *Piper methysticum*). Although the interior of Pohnpei is densely vegetated, the clearcutting of 1–2 ha plots for the cultivation of sakau has increased in recent years, reaching to the edge of the cloud forest at about 600 m in some areas. W. Raynor (Director of The Nature Conservancy on Pohnpei) has achieved some measure of success in encouraging traditional leaders to adopt a program to have local farmers “plant low,” but resistance is high because sakau grows best on the wet mountain slopes and patches in such remote areas are perhaps less likely to be pilfered.

At least two of the five species of birds endemic to Pohnpei are nearly confined to high elevation forest and are the most seriously threatened by encroaching agriculture. The cloud forest is probably the last bastion for the Pohnpei Mountain Starling (Buden 1996), which formerly occurred also at lower elevations (Baker 1951). The Long-billed White-eye is nearly as confined with 89% of the observations in 1983 and 88% of those in 1994 being from elevations above 400 m, which comprise only about 10% of the total land area (Table 1). The uplands are also the primary habitat of the Micronesian Pigeon.

The disparity in numbers of birds observed between the two surveys merits further investigation. Protection of the upland forests from further degradation and more frequent monitoring of bird populations to better assess population trends is strongly urged.

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